**Red Planet Recycle- Supervisor Meeting**

**Minutes**

**Tuesday 7th February, 14:00**

**Classroom 7**

**Members Present**

Yassen Abbas (YA) Lois Doig (LD) Bo Peng (BP)

Jamie Cassels (JC) Gareth Herron (GH) Charlotte Raymond (CR)

Malcolm Chambers (MC) Sam Jones (SJ) Samuel Walpole (SW)

Scott Clark (SC) Dylan Martin (DM) James Young (JY)

**Supervisors Present**

Dr Prashant Valluri

Dr Lev Sarkisov

**Section 1: Key Findings of Presentation**

Water Treatment – LD, MC, YA, GH

* Discussion of Water Storage
* Decision has been made to recycle on a daily basis
* In depth look into the individual units making up the WPA and discussion of the assumptions involved: Multi-filtration beds; Reactor Gas-Liquid Separator and Ion- Exchange Bed
* In depth look into the Urine Processing Assembly
* Discussion of the Fluid pump assembly and distillation assembly
* An aim to look into simpler process designs for the Mars Space Station was discussed
* Discussion of an alternative method currently being developed by NASA- Membrane bioreactors, which was previously dismissed.
* An in depth insight into the technology involved and discussion of microorganism survival.

Removal of CO2– SC, SJ, CR

* Discussion of TSA and Indirect Heating
* Molecular Sieves decided as Preferred technology
* Mass Balance was presented (still awaiting confirmation it is correct)
* Outline of design requirements was provided
* Discussion of the Desiccant Bed and CO2 Adsorbent Bed

Processing CO2 – JC, JY

* Results provided of MATLAB Model of flow rate vs residence time
* Selected Operating Pressure of 0.9 atm
* Comparison of Isothermal and Non-Isothermal models was discussed
* Discussion of carbon dioxide storage vessel and gas separation and recycling

Converting H2O into O2  - SW, DM, BP

* A design basis, process description, BFD and key process parameters were provided
* Materials for the process were discussed and compared
* The Advantages and Disadvantages of the condensing heat exchanger were discussed
* Different options for Gas-Liquid separation were looked into: gravity, inertial, filtration and centrifugal separations
* Centrifugal was mentioned as the most applicable

**Section 2: Tasks for Next Week**

Confirm Slides for presentation on Thursday the 9th

Water Treatment

* Continue design of the WPA and UPA processes
* Confirm Water Storage and look into materials
* Continue looking into Membrane Bio- Reactor Process
* Alter previous requirements to accommodate reasons for designing Membrane Bio-Reactor

CO2 Removal

* Continue Design of individual units within the CDRA system.
* Find Heat Transfer Coefficients of Zeolites
* Begin design of individual units within the CDRA system.
* Look into initial design stages of Humidity Heat Exchanger
* Mass Balance requires confirmation from another sub-group

Processing CO2

* Determine best operating temperature and pressure model to run using MATLAB Model
* Continue Sizing Reactor
* Find ways to remove heat if model is decided as non-isothermal

Converting H2O into O2

* Begin design of individual units within electrolysis system.
* Confirm choice of gas separation and being design

**Section 3: Additional Notes from Presentation**

* If sourced, provide equilibrium data
* Mass Balances required to be confirmed by another sub group
* State assumptions and make sure they are backed up by logical engineering theory
* Continue writing up work both individually and for the volume 1 report
* Make sure when presenting that where the unit being discussed sits in a PFD context, is provided.
* Provide diagrams with feed in and out with flow rates and assumed compositions

**Section 4: New Positions Appointed**

Lois Doig was appointed Chairperson

Charly Raymond was appointed Secretary